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March 29, 2000

APR - 7 2000

Ms. Magalie Roman Salas
Secretary
Federal Communications Commission
The Portals TW-A325
445 12th Street, SW
Washington, DC 20554

Re: 1998 Biennial Regulatory Review – Amendment of Part 18 of the Commission's Rules to Update Regulations for RF Lighting Devices
Docket No. 98-42 / Our Ref.: 07330-008001

BOSTON
DELAWARE
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SAN DIEGO
SILICON VALLEY
TWIN CITIES
WASHINGTON, DC

Dear Ms. Salas:

Attached hereto is a recent article published in Wireless Design & Development magazine which Fusion Lighting would like to have included in the public record in the above-captioned docket. The author of the article is lead counsel for the Part 15 Interests, an active party in the proceeding.

What Fusion regards as significant about the article in relation to the current docket, are the references to ISM lighting. The author states that:

- the introduction of ISM lighting is the "biggest threat of interference" to unlicensed users of the spectrum;
- ISM emissions should be capped at the "maximum levels in common use today;" and
- companies who depend on unlicensed devices are "not likely to stand by quietly in the face of disabling interference."

The article makes the case that interference to unlicensed devices from ISM in general, and lighting in particular, is unavoidable, will get worse over time and will never be tolerated by Part 15 manufacturers and users. Fusion concurs in these views. Indeed, these are the reasons for Fusion's recently filed Petition for Further Rulemaking, which we now urge the Commission to adopt as quickly as possible.

Very truly yours,

Terry G. Mahn

Enclosure
cc: Service List

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By Mitchell Lazarus

Mitchell Lazarus is a lawyer with the firm of Fletcher, Heald & Hildreth in Arlington, Virginia. He has 16 years experience representing clients at the FCC, particularly on technical issues. He can be reached at 703-812-0440, or email MLazarus@aol.mitedu.

# Unlicensed Transmitters Need Respect

A radio transmitter need not have a license if its power is low enough. Millions of unlicensed transmitters operate in both consumer and commercial environments, soon to be joined by millions more Bluetooth radios. All of this apparatus uses shared bands, and is always subordinate to the other services in those bands. Not only must an unlicensed system accept any and all incoming interference, but it must shut down if it causes harmful interference to a licensed service. Unlicensed operation has great potential to ease congestion in the spectrum — but not until these draconian rules are eased.

## Handing Out Spectrum

Radio spectrum is an increasingly scarce commodity. As the saying goes about real estate, they're not making any more of it. Just fifteen years ago there was still significant empty space below 1 GHz, not to mention wide swaths higher up. But today, except for a few narrow slivers, the allocation tables are unbroken past 40 GHz. And the demand for spectrum only continues to increase.

The FCC has the task of putting the limited RF bandwidth to maximum use, while keeping interference between users to tolerable levels. It has tried several different approaches over the years:

## Spread Spectrum Emerges

The earliest Part 15 devices were mere conveniences and playthings, like garage door openers and remote control toys. Critical radio applications insisted on licensed spectrum, which offers regulatory protection against interference. But the 1980s brought two changes. Technical advances brought down the cost of sophisticated low-power radios, a trend that continues today. And a 1985 FCC order allowed Part 15 radios to use spread spectrum modulation in three bands, at the relatively high output power of one watt. That decision launched one of the FCC's great success stories.

Spread spectrum not only tolerates interference relatively well, but also causes relatively little interference to others. With the availability of spread spectrum, commercial and industrial applications began migrating to Part 15. Subsequent FCC rule changes permitted greater throughput and thus broadened the range of potential uses. Today, about $1.5 billion worth of spread spectrum Part 15 equipment serves diverse applications: wireless LANs and PBXs, retail cash register and inventory systems, patient telemetry in hospitals, package and baggage handling, warehouse "picking" operations, broadband Internet access, and consumer products that include cordless telephones.

**The decision to authorize spread spectrum launched one of the FCC's great success stories.**

In the view of many experts (including some of my clients), the biggest threat of interference from co-users lies in the possible introduction of high-emission ISM lighting equipment, a matter now before the FCC. Other interference hazards may arise from alternative standards for spread spectrum equipment. Much of the industry (again, including my clients) is concerned that pending proposals to relax the spread spectrum rules would authorize products that interfere badly with existing low-power equipment, thus threatening an arms race of power increases that would ultimately make the band inhospitable to all.

At the same time, attitudes toward interference are inevitably hardening. A company whose vital operations depend on an expensive spread spectrum network is not likely to stand by quietly in the face of disabling interference. Nor will that company be eager to shut down its system just because it causes interference to an amateur operator, as the rules presently require.

Yet relocating the millions of Part 15 transmitters to the over-congested licensed bands is hardly a feasible option. Unlicensed operation is here to stay. The FCC should welcome its expansion, because Part 15 offers it an extremely efficient way of distributing spectrum. By the same token, however, those users want assurance that their equipment will continue to operate reliably.

past 40 GHz. And the demand for spectrum only continues to increase.

The FCC has the task of putting the limited RF bandwidth to maximum use, while keeping interference between users to tolerable levels. It has tried several different approaches over the years:

- The earliest licensing model draws a contour around each transmitter, marking the edge of a signal strong enough to cause interference. Each new applicant must prevent its own interference contour from overlapping others.
- An applicant for a point-to-point microwave or satellite earth station sends technical information on its proposed facility to all other users who might be affected. Stations that expect interference may object. In practice, most issues can be resolved with minor changes to the applicant's plans.
- A third approach allows the licensee to build transmitters anywhere in a specified geographic area. Each licensee need coordinate with others only near their common boundaries.
- The fourth method of squeezing users into spectrum is unlicensed operation. This approach regulates the transmitter, not the user. Once certified by the FCC for technical compliance, a transmitter can be used by anyone, for any lawful purpose, anywhere in the United States and its territories, without further action by the FCC.

Most radio services are assigned their own bands of the spectrum, or at worst must share with one or two other classes of users. But unlicensed transmitters — also called Part 15 devices, after the FCC rule section that governs them — have no spectrum of their own. They are barred altogether from some frequencies, and are allowed more power in some bands than others. But they must accept interference everywhere, and must cease operations if they cause any.

equipment serves diverse applications: wireless LANs and PBXs, retail cash register and inventory systems, patient telemetry in hospitals, package and baggage handling, warehouse "picking" operations, broadband Internet access, and consumer products that include cordless telephones and wireless headphones and speakers, among others.

Although unlicensed usage was originally adopted for its convenience, it has also proved to be an excellent method of distributing spectrum. The administrative cost to both user and government is essentially zero. And yet, even with dense deployment, interference among Part 15 devices is rarely severe enough to curtail operation. In part this is because users have independent incentives to keep their power levels down, in order to prolong battery life and to maximize frequency reuse. In fact, except for narrow-beam point-to-point equipment that covers long distances, the vast majority of spread spectrum equipment operates far below the 1 watt maximum, usually under 50 milliwatts. The soon-to-be-ubiquitous Bluetooth transmitters will use far less, only 1 milliwatt.

**A company whose vital operations depend on an expensive spread spectrum network is not likely to stand by quietly in the face of disabling interference.**

As critical applications proliferate, however, interference concerns are resurfacing. The three Part 15 spread spectrum bands are variously shared with several kinds of government users, private land mobile radio, the Location and Monitoring Service (for tracking fleet vehicles), amateur radio, and Industrial, Scientific, and Medical equipment (ISM), which produces RF energy for purposes FCC should welcome its expansion, because Part 15 offers it an extremely efficient way of distributing spectrum. By the same token, however, those users want assurance that their equipment will continue to operate reliably.

### Needed Rule Changes

From the start, the FCC rules have treated "unlicensed" as synonymous with "unprotected from interference." It is time to reconsider that equation. At the outset, the FCC should summarily reject proposals to authorize spread spectrum transmitters that threaten the operation of low power, non-interfering equipment. Second, ISM emissions should be capped at roughly the maximum levels in common use today. ISM is the one remaining FCC-regulated service with unlimited in-band emissions, a luxury the over-crowded spectrum can no longer accommodate. Third, the rules should provide that a spread spectrum transmitter operating within specified limits need not shut down, even if it causes harmful interference to a licensed service. The limits that define this "safe harbor" can be set to minimize load on the spectrum by encouraging transmitters to operate at low power, high antenna gain, or both.

With these adjustments, unlicensed operation can continue to take the pressure off scarce licensed spectrum, while solving telecommunications problems of industries, businesses, and individuals throughout the country.